CHANGES OF THE BIOELECTRICAL ACTIVITY OF PATIENTS WITH SUBTENTORIAL NEOPLASMS

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The complex of general-brain, local and distant electroencephalogrammic (EEG) changes confirms the differentiation between intratentorial and supratentorial localization of brain neoplasms, as well as the toponymy of their posteriocranial situation (1, 2, 5, 5). The possibility of EEG study, concerning the site, character and prognosis of neoplasms in posterio-cranial fossette (PCF), are limited because of the lack of total coincidence of the degree of bioelectrical changes, clinical symptoms and histological nature of expansive processes (1, 5, 7).

Analysing bibliographical and data of our own, we have for an object of the present study to determine the characteristic EEG-peculiarities of tumours in PCF due to their localization, state and histological structure, by using the dynamics of the bioelectrical changes.

The study covers 76 patients with established neoplasms in PCF; age 5—49. EEG-recording are carried out with bipolar and monopolar wiring of electrodes, conformed with the International System "10—20%", as well as the applying of standard functional loading. The investigation is repeated several times before operation; 11 cases are studied after the operation. Tumours of 11 patients are located in the upper part of the IVth ventricle and in the pons, 26 patients — in the cerebellum hemispheres, 23 — in the vermis, 13 — in the ponscerebellum angle and 2 — the pons and lower part of the IVth ventricle. Histologically the operated neoplasms are medulloblastoma (14 cases), ependymoblastoma (11), ependymoma (5), undifferentiated astrocytoma (6), neurinoma (13).

The basic changes of bioelectrical activity of tumours in the cerebellum hemispheres represent a diffusive character stated by generalized teta and delta activity and exclusively high-voltage delta deviations (1—3 sec). This proves the fact that the tumours in the PCF are not an isolated focused process, but they tend to distant disorders of the core functional state. Only 1 case shows a normal alpha rhythm whereas the rest have tapering teta and delta waves for a background activity with an expressed engagement of the occitital zones (15 cases) and fronted localization uncorresponding to the side of the tumour process (4 cases). The symmetry of the bioelectrical changes in spite of the lateralization of the expansive process in PCF is a characteristic peculiarity for the investigated patients before operation (fig. 1).

Neoplasms located in the upper part of the IVth ventricle and lamina quadrigemina are characterized with paroxysmal generalization of teta- and delta-activity, slightly expressed polymorphism of the waves and certain localization of the changes of the frontal lobes. According to our results and those of Mayorchick V. E. (6) and Faller T. O. (7), it can be referred to

the occlusive intracranial hypertension and tumour compression on the superior parts of the brain stem; therefore, a particular de-afferentation of the core and delay of the base-rhythm is registered.

The medulloblastomas with vermal localization are characterized with high-voltage peak-waves, rhythmic monomorphic teta- and delta-discharge

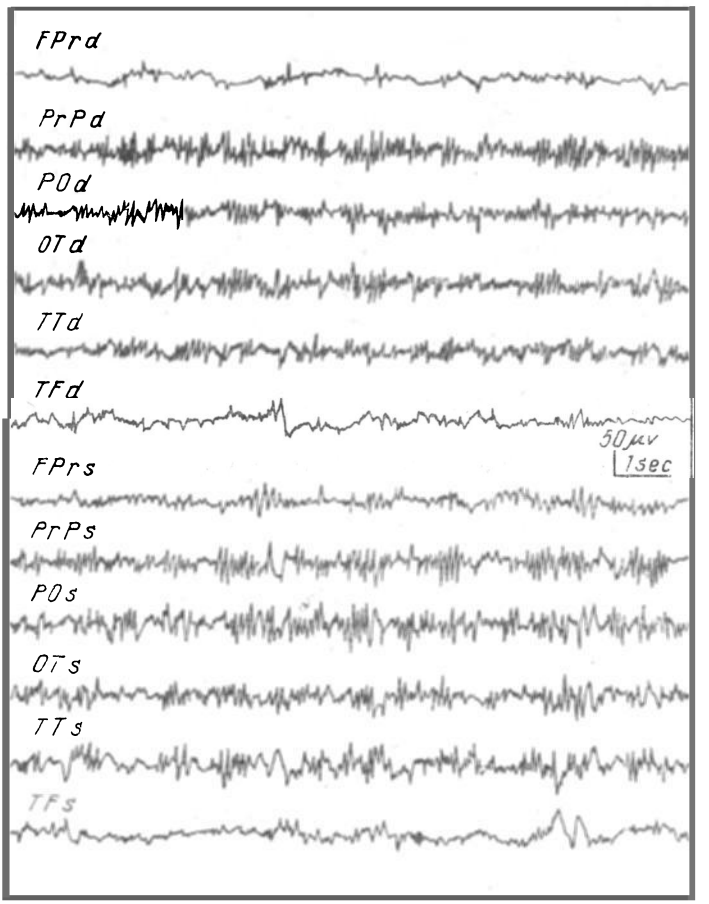

Fig. 1: EEG of V.A.P., age 27, with medulloblastoma in the right cerebral hemisphere

with expressed bilateral localization. Local and side disposition is not registered (fig. 2). The changed reticular formation plays an important role in the genesis of these secondary discharges. This change is a result of an expansive process with a latercoming effect of a stable desynchronization and dysrhythmia of the brain potentials and prevailing of the quick amplitudes and epileptiformic potentials, according to Batza T., U. Frunze (1), Vedenskaya I. V. (3), Gorbach N. L. (4).

The pontocerebellar-angle tumours, in contrast to the cerebellum medulloblastomas, are characterized with slighter general-brain changes,

mainly of irregular alpha rhythm and hemispherial asymetry, while 3 cases show a temporal focus of teta and peak waves, 2 cases — occipital. All patients lack bilateral hypersynchronization of the pathological graphoelements (fig. 3).

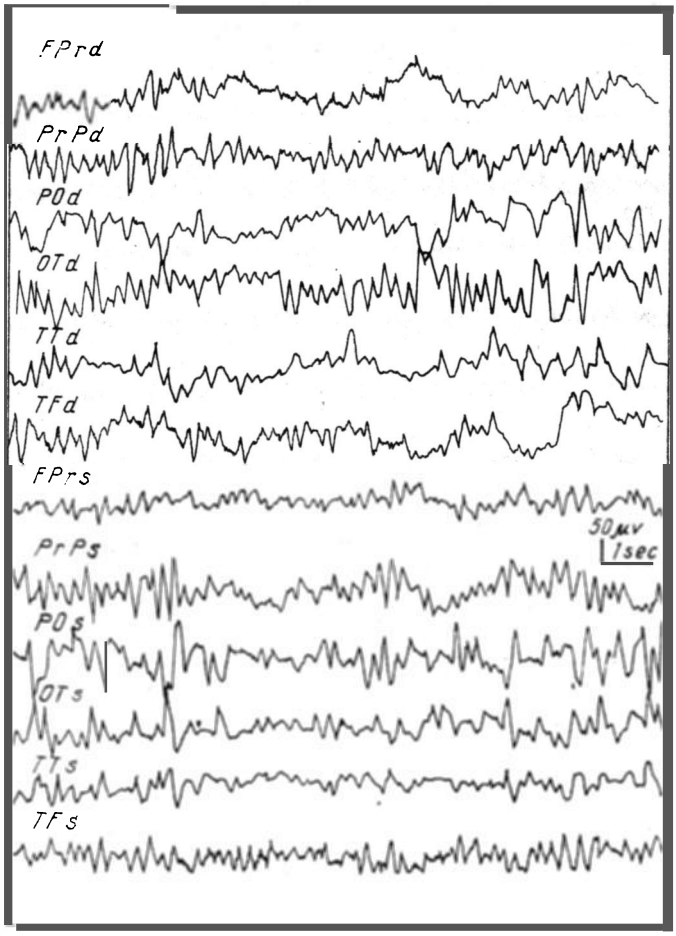

Fig. 2: EEG of S.A.H., age 21 1/2, with ependymoblastoma in the vermis and pons

The diagnostic value of EEG-investigation is increased considerably in the course of the second recordings. The study before operation, in spite of the hystological structure of the cerebellum and vermis tumours, shows a progress of the diffusive changes with a show-wave character, frequent discharge activity and vanishing of the focal changes. EEG dynamics of the postoperatively investigated patients is established, where there is a coincidence between the bioelectrical changes and clinical state of the massive process. Comparing the bilateral synchronal EEG-changes and "pseudofocal" bioelectrical activity changes with the background ones, shows the

damage of the cerebello-core connections, also the immediate effect of the tumour upon the brain stem and the increasing intracranial hypertension. These data are confirmed by the clinical EEG-investigations of Mayorchick V. E. (6), Blagoveshtenskaya N. S. (2), Faller T. O. (5).

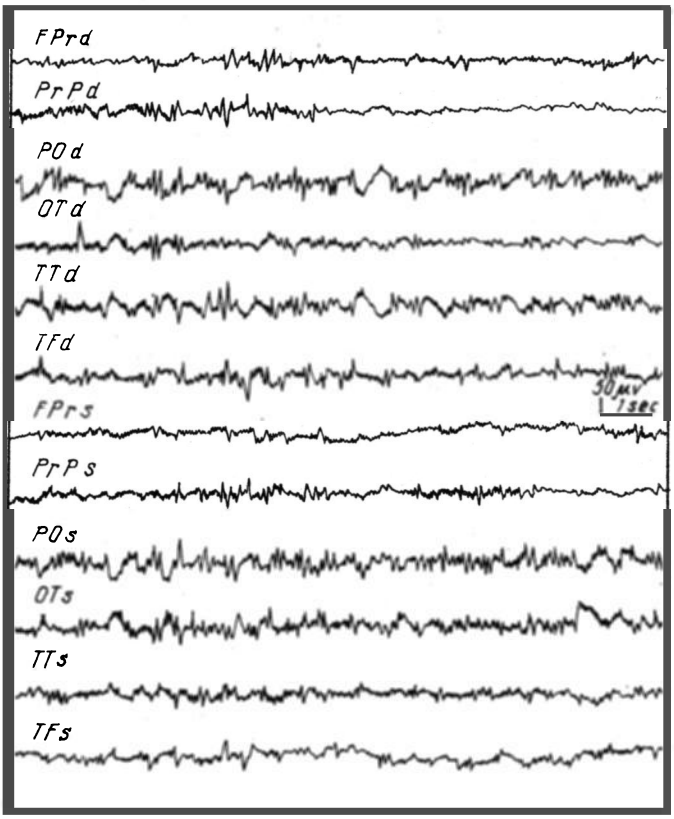

Fig. 3: EEG of A.O.A., age 49, with neurinoma in the left pontocerebellar angle

The analysis of the received results suggests the presence of certain mutual relations between EEG-changes, toponomy and stage of development of PCF-tumours. There is no relation between the bioelectrical changes and the character of expansive processes. Most important is the juxtaposition of the clinical features, age and dynamic clinical-EEG study. The pathological biopotentials determine the unspecific reaction of the core, which is a result of its interaction with the stem structure, thus expressing the generalization of the general-brain reaction of peak and slow-wave amplitudes into frequent discharges. The present "pseudofocal" changes of occipital, temporal and frontal (more rare) localization do not exclude the presence of a PCF-tumour, but without any possibility for a precise localization. The slighter diffusive and local EEG-changes are characteristic for the expansive

processes of pontocerebellar angle and cerebellar neoplasmas, while those of the vermis and IVth ventricle require bilateral synchronical slow-wave discharges on the background of rough diffusive EEG-changes.

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ИЗМЕНЕНИЯ БИОЭЛЕКТРИЧЕСКОЙ АКТИВНОСТИ У БОЛЬНЫХ С СУБТЕНТОРИАЛЬНЫМИ НЕОПЛАЗМАМИ

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РЕЗЮМЕ

Автор анализирует динамику БЭА у 76 больных с опухолями задней ямки черепа, доказанными патолого-анатомически. Не было установлено определенной зависимости между ЭЭГ изменениями и характером экспансивных процессов. Решающее значение имеет сопоставление биоэлектрических изменений с клиническими признаками, возрастом и динамическими клинико-ЭЭГ наблюдениями. Патологические биопотенциалы отражают неспецифическую реакцию корковой ткани в результате ее взаимодействия с мозговым стволом. Они представдены медленноволновыми графоэлементами с острыми колебаниями, синхронизирующими в частных разрядах. Появление гемисферной ассиметрии с псевдоочаговыми изменениями с затылочной, лобной или височной локализациями не исключает наличия опухоли в задней ямке черепа при невозможности определить его точное расположение. Более легкие общемозговые и локальные изменения характерны для экспансивных процессов мосто-мозжечкового угла и для гемисфер малого мозга в начальной стадии развития, в то время как указанные изменения с затрагиванием мозжечка, IV желудочка и мозгового ствола вызывают глубокие диффузные изменения ЭЭГ медленноволнового характера с подчеркнутой пространственной синхронизацией.